IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

BAMDAD, Cynthia et al.

Application No.: 10/016,416

Filed: December 10, 2001

For: ***Detection of Target Analytes Using Particles and Electrodes***

Examiner: LU, Frank Wei Min

Art Unit: 1634 Conf. No.: 1226

CERTIFICATE OF ELECTRONIC TRANSMISSION UNDER 37 C.F.R. 1.8

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JERE VALLES

PRE-APPEAL BRIEF REQUEST FOR REVIEW

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Sir:

In accordance with 1296 Off. Gaz. Pat. Office 67 (July 12, 2005), Applicants request review of the Examiner's final rejections of: (a) claims 18, 20, 24 and 27 under 35 U.S.C. § 103(a) over Sigal et al. (U.S. Patent No. 6,319,670 B1) ("*Sigal*") in view of Meade et al. (U.S. Patent No. 5,770,369) ("*Meade*") and Roberts et al. (U.S. Patent No. 5,958,791) ("*Roberts*"), (b) claim 21 under 35 U.S.C. § 103(a) over *Sigal* in view of *Meade* and *Roberts*, and further in view of Bamdad et al. (U.S. Patent No. 5,620,850) ("*Bamdad*"), (c) claim 22 under 35 U.S.C. § 103 over *Sigal* in view of *Meade* and *Roberts*, and further in view of Gerpheide et al. (U.S. Patent No. 5,565,658) ("*Gerpheide*"); (d) claim 23 under 35 U.S.C. 103(a) over *Sigal* in view of *Meade* and *Roberts*, and further in view of Kayyem et al. (U.S. Patent No. 6,096,273) ("*Kayyem*"); (e) claim 25 under 35 U.S.C. 103(a) over *Sigal*, in view of *Meade* and *Roberts*, and further in view of *Kayyem*; (f) claim 23 under 35 U.S.C. 103(a) over *Sigal* in view of *Meade* and *Roberts*; and (g) claim 25 over *Sigal* in view of *Meade* and *Roberts*.

I. There is no motivation to combine *Sigal* with *Meade* or *Roberts*

A. The proposed modification or combination of *Sigal* with other references would change the principle of operation of *Sigal*.

The present invention is directed to the detection of electrons (detecting transfer using a detector that is capable of detecting voltage), which is different from *Sigal* which teaches the detection of photons (electrochemiluminescence).

Sigal is directed to compositions and methods used to measure the presence of analyte by measuring electrochemiluminescence triggered by a voltage imposed on a working electrode. See col. 1, lines 15 – 19 and lines 48-49. In electrochemiluminescence assays, a reactive species is reduced and thus placed in an excited state. Upon relaxation, a photon is emitted and detected by a photomultiplier tube (PMT). This is in contrast to electron transfer, which is detected using a detector that is capable of detecting voltage rather that photons.

The Examiner concedes that "Sigal *et al.* do not disclose a substrate comprising an array of electrodes and a detector capable of detecting the voltage associated with electron transfer moiety as recited in a) and c) of claim 18." Page 3 of the final Office Action. The Examiner relies on *Meade* to provide the motivation for replacing the photon detector of *Sigal* with the "detector capable of detecting a voltage associated with electron transfer from said electron transfer moiety" as recited in the claims. However, the Examiner fails to distinguish between detection of photon (electrochemiluminescence) and detection of electrons (electron transfer). The Examiner states in pages 8 -9 of the Office Action:

> [T]he detector capable of detecting the integrated photocurrent associated with electron transfer from said ECL comprising electron transfer moiety taught by *Sigal et al.*, and the detector capable of detecting the voltage associated with electron transfer taught by Meade et al., are used for the same purpose (ie. detecting electron transfer of the transitional metal complex), the detector taught by Sigal *et al.*, and the detector taught by Meade et al., are exchangeable in order to detect electron transfer of the transitional metal complex.

Thus, the Examiner assumes that the principle of operation of *Sigal* is "to detect electron transfer of the transitional metal complex." Applicants respectfully disagree.

Reviewing *Sigal* immediately shows that *Sigal* is specifically and solely directed to electrochemiluminescence that is based on the detection of photons, rather than electrons.[1] In *Sigal*,

[1] For example, the Title of *Sigal* is "Methods and Apparatus for Improved Luminescence Assays Using Microparticles." In the section tiled "Filed of the Invention" *Sigal* states: "This application relates generally to methods and compositions for conducting binding assays, more particularly to those which measure the presence of an analyte of interest by measuring electrochemiluminescence emitted by one or more labeled

although the photons are detected by detecting electrons, those electrons are produced due to photoelectric effect (the generation of electrons when photons strike a photocathode material in the PMT), not due to electron transfer.

Therefore, the principle of operation of *Sigal* is the detection of "electrochemiluminescence," NOT the detection of "electron transfer of the transitional metal complex."

B. The proposed modification of *Sigal* in view of *Meade* would render the assays of *Sigal* unsatisfactory for their intended purpose.

The detector of claim 18 does not detect photons, therefore, the ligand binding according to *Sigal* could not be detected. Accordingly, the compositions and methods for conducting electrochemiluminescence binding assays of *Sigal* would not achieve their intended purpose if the detector of claim 18 replaced the photomultiplier tube in *Sigal*.

C. There is no a reasonable expectation of success by combining *Sigal* with *Meade*.

The detector of claim 18 does not detect photons and thus the ligand binding according to *Sigal* could not be detected. Therefore there is no reasonable expectation of success by combining *Sigal* with *Meade*.

Further, the deficiency of *Sigal* is not cured by *Bamdad* which also does not teach "a detector capable of detecting the voltage associated with electron transfer moicty".

D. The references in combination does not teach "an array of working electrodes."

The Examiner concedes *Sigal* does not teach "an array of working electrodes." See page 4 of the final Office Action mailed on May 28, 2008 ("Office Action"). However, the Examiner states that "the rejection ... is based on the combination of patents ... and is not on whether Roberts et al. teach working electrode or not as argued by applicant." See page 7 of the Office Action.

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components of the assay system." (Emphasis added.) Col. 1, ll. 15-19. In the section titled "Objects of the Invention" *Sigal* further states: "a primary object of this invention to provide methods, reagents and compositions, for conducting of electrochemiluminescence binding assays." (Emphasis added.) Col. 2, ll. 12-23. In the section titled "Summary of the Invention" *Sigal* states that:

These and other objects of the invention are achieved using microparticles comprised of an electrically conductive material having (a) one or more copies of an assay ligand immobilized on its outer surface, and (b) a plurality of ***electrochemiluminescent moieties*** immobilized on its outer surface. The assay ligand may be linked to the ***electrochemiluminescent moiety***. More specifically, it has now been found that colloidal gold is a highly advantageous conductive material with which to form microparticles. Colloidal gold particles having one or more assay ligands immobilized on its outer surface and a plurality of ***ECL moieties*** immobilized on its outer surface can be used in a wide range of assay formats, including those based on ***detecting the ECL*** from moieties immobilized on the particle and those based on the modulation by the particles of the ***ECL from free ECL moieties in*** solution. The objects of the present invention may also be achieved using microparticles that do not comprise electrically conductive material. (Emphasis added.) Col. 2, ll. 46-64.

The Examiner cites *Roberts* for its disclosure of the "advantage of fabricating small electrode in interdigitated arrays." Page 4 of Office Action. However, the interdigitated arrays in *Roberts*, col. 7, l. 66 – col. 8, l. 26, as cited by the Examiner, are not arrays of working electrodes. *Roberts* relates to a test device for detecting or determining an analyte in a test solution. *Roberts* states that "[a]dvantages of fabricating small electrodes in interdigitated array go even further by allowing redox cycling of ions back and forth between anode(s) and cathode(s)." This passage implies that the interdigitated array of *Roberts* comprises not working electrodes, but rather, one working electrode having multiple fingers interdigitated with one reference electrode also having multiple fingers.

Moreover, the advantages of "increasing the size of mass transport, increasing the signal-to-noise (faradaic/charging current) ratio, and decreasing ohmic signal losses" are in reference to the small scale of the *Roberts* electrodes, rather than to any configuration of working electrode.

As all of the rejections are based on the combination of *Sigal*, *Meade* and *Roberts*, all the rejections ((a)-(g)) are improper and should be withdrawn.

E. *Gerpheide* explicitly teaches away from *Roberts*

Assuming, *arguendo,* that *Roberts* teaches an array of working electrodes, *Gerpheide* still explicitly teaches away from *Roberts* because *Roberts* teaches that its device "includes an absorbent material," and in contrast, *Gerpheide* teaches that the electrode array using materials that are not an absorbent material.

Roberts teaches at col. 5, ll. 32-34, that its device "includes an absorbent material, having a contact portion proximate to one end for contact with and uptake of the test solution." Each of the conductors in *Roberts* "comprises a plurality of fingers disposed on the absorbent material." *Id.* at lines 37-38. Absorbent material means

> a porous material having a pore size of from 0.05 μm to 50 μm, preferably from 0.45 μm to 5 μm, which is susceptible to traversal by an aqueous medium in response to capillary force. Such materials may be natural polymeric materials, particularly cellulosic materials, such as fiber-containing papers, . . . [and] synthetic or modified naturally occurring polymers, such as nitrocellulose. . . . Nitrocellulose is a preferred absorbent material. *Id.* at col. 12, lines 3- 15.

Gerpheide, however, teaches at col. 5, ll. 28-30, that "the electrode array may utilize a flexible printed circuit board, such as a flex circuit, or stampings of sheet metal or metal foil." One of skill in the art would understand that sheet metal and metal foil are not absorbent materials. Furthermore, one of skill in the art would understand that substrates used in flex circuits are preferably not absorptive. See Joseph Fjelstad, (Exhibit A in the response filed on July 23, 2007)("Moisture absorption is definitely not

desirable for any flexible substrate. Moisture can negatively impact both the manufacturing process (by causing delamination, in process or in assembly) and the performance of the finished product (by altering the material's dielectric constant and increasing signal loss.)")

Therefore, *Gerpheide* explicitly teaches away from *Roberts* because *Roberts* teaches that its device "includes an absorbent material," and in contrast, *Gerpheide* teaches that the electrode array may utilize a flexible printed circuit board, such as a flex circuit, or stampings of sheet metal.

Accordingly, the rejection of (c) is improper and should be withdrawn.

II. The Examiner erred in citing *Kayyem* which cannot preclude patentability of the presently claimed invention under U.S.C. § 103.

Both the instant application and the *Kayyem* patent were, at the time the invention of the instant invention was made, owned by Clinical Micro Sensors, Inc. The instant application is a continuation of U.S. Appl. No. 09/428,155, issued as U.S. Patent No. 6,541,617 (allowed by the same Examiner), the assignment of which is recorded in Reel/Frame 010625/0568. Therefore, according to U.S.C. § 103(c)(1), *Kayyem* cannot preclude patentability of the presently claimed invention under U.S.C. § 103.

Accordingly, the rejections of (d) and (e) are improper and should be withdrawn.

III. Conclusion

Prompt and favorable consideration of this Request is respectfully requested. If the Examiner believes, for any reasons, that personal communication will expedite prosecution of this application, Examiner and the Panel are invited to telephone the undersigned at the number provided below.

The Commissioner is authorized to charge any additional fees associated with this communication, including any necessary fees for extension of time or additional claims, and/or credit any overpayment to Deposit Account No. 50-0310 (Attorney Docket No. 067456-5020-US01).

Respectfully submitted,

Dated: 09/02/2008

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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number
067456-5020-US01

CERTIFICATE OF ELECTRONIC TRANSMISSION UNDER 37 C.F.R. 1.8

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Jere Valles

Signature: Jere Valles

Application Number: 10/016,416
Filed: December 10, 2001
Inventor: BAMDAD, Cynthia et al.
Art Unit/Conf. No.: 1634/1226
Examiner: LU, Frank Wei Min

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a Notice of Appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided

I am the attorney or agent of record.

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NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

*Total of 1 forms are submitted.

This collection of information is required by 35 U.S.C. 132. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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